CLAIMS

What Is Claimed Is:

1. A system for indicating a property of a medium in which a light source is encompassed, comprising:

an image acquisition device that captures an image of the light source; and

a computer that receives the image from the image acquisition device, identifies the light source in the image, models multiple scattering of light from the light source in the medium using a Radiative Transfer Equation for Spherical Media, and determines the property of the medium using the Radiative Transfer Equation for Spherical Media.

2. The system of claim 1, wherein the medium is the earth's atmosphere.

3. The system of claim 2, wherein, in determining the property of the medium, the computer determines whether particles surrounding the light source are one of aerosols, haze, mist, rain, and fog.

4. The system of claim 1, wherein the medium is within a body.

5. The system of claim 1, wherein the medium is one of blood and tissue.

6. The system of claim 1, wherein the medium is a water solution.

7. The system of claim 1, wherein the computer models the multiple scattering of the light using a Legendre polynomial.

8. The system of claim 1, wherein the computer models the multiple scattering of the light using an axially symmetric phase function.

9. The system of claim 1, wherein the computer models the multiple scattering of the light using a *Henyey-Greenstein* phase function.

10. The system of claim 1, wherein the computer models the multiple scattering of the light without using a Monte-Carlo technique.

11. The system of claim 1, wherein, in determining the property of the medium, the computer determines the forward scattering parameter of the medium.

12. The system of claim 1, wherein, in determining the property of the medium, the computer determines the relative size of particles surrounding the light source.

13. The system of claim 1, wherein, in determining the property of the medium, the computer determines the range from the light source to the image acquisition device.

14. The system of claim 1, wherein, in determining the property of the medium, the computer determines the optical thickness of the medium.

15. The system of claim 1, wherein, in determining the property of the medium, the computer determines the visibility to the light source.

16. The system of claim 1, wherein the computer also determines whether enough coefficient terms are being used in solving the Radiative Transfer Equation for Spherical Media.

17. The system of claim 1, wherein the computer also averages different values of detected intensity of a glow of the light source along radial contours of the image.

18. A system for altering an image containing a light source encompassed in a medium, comprising:

a computer that receives the image, identifies the light source in the image, generates a model of multiple scattering of light from the light source in the medium using a Radiative Transfer Equation for Spherical Media, and alters the image based upon the model.

19. The system of claim 18, wherein the medium is the earth's atmosphere.

20. The system of claim 18, wherein the medium is within a body.

21. The system of claim 18, wherein the medium is one of blood and tissue.

22. The system of claim 18, wherein the medium is a water solution.

23. The system of claim 18, wherein the computer generates the model using a Legendre polynomial.

24. The system of claim 18, wherein the computer generates the model using an axially symmetric phase function.

25. The system of claim 18, wherein the computer generates the model using a *Henyey-Greenstein* phase function.

26. The system of claim 18, wherein the computer generates the model without using a Monte-Carlo technique.

27. The system of claim 18, wherein, in altering the image based upon the model, the computer adds a multiple scattering effect to the image.

28. The system of claim 18, wherein, in altering the image based upon the model, the computer removes a multiple scattering effect from the image.

29. A method for indicating a property of a medium in which a light source is encompassed, comprising the steps of:

capturing an image of the light source;

identifying the light source in the image;

modeling multiple scattering of light from the light source in the medium using a Radiative Transfer Equation for Spherical Media; and

determining the property of the medium using the Radiative Transfer Equation for Spherical Media.

30. The method of claim 29, wherein the medium is the earth's atmosphere.

31. The method of claim 30, wherein the determining step comprises determining whether particles surrounding the light source are one of aerosols, haze, mist, rain, and fog.

32. The method of claim 29, wherein the medium is within a body.

33. The method of claim 29, wherein the medium is one of blood and tissue.

34. The method of claim 29, wherein the medium is water solution.

35. The method of claim 29, wherein the modeling step uses a Legendre polynomial.

36. The method of claim 29, wherein the modeling step uses an axially symmetric phase function.

37. The method of claim 29, wherein the modeling step uses a *Henyey-Greenstein* phase function.

38. The method of claim 29, wherein the modeling step does not use a Monte-Carlo technique.

39. The method of claim 29, wherein the determining step comprises determining the forward scattering parameter of the medium.

40. The method of claim 29, wherein the determining step comprises determining the relative size of particles surrounding the light source.

41. The method of claim 29, wherein the determining step comprises determining the range from the light source to the camera.

42. The method of claim 29, wherein the determining step comprises determining the optical thickness of the medium.

43. The method of claim 29, wherein the determining step comprises determining the visibility to the light source.

44. The method of claim 29, further comprising determining whether enough coefficient terms are being used in solving the Radiative Transfer Equation for Spherical Media.

45. The method of claim 29, further comprising averaging different values of detected intensity of a glow of the light source along radial contours of the image.

46. A method for altering an image containing a light source encompassed in a medium, comprising the steps of:

receiving the image;

identifying the light source in the image;

generating a model of multiple scattering of light from the light source in the medium using a Radiative Transfer Equation for Spherical Media; and

altering the image based upon the model.

47. The method of claim 46, wherein the medium is the earth's atmosphere.

48. The method of claim 46, wherein the medium is within a body.

49. The method of claim 46, wherein the medium is one of blood and tissue.

50. The method of claim 46, wherein the medium is a water solution.

51. The method of claim 46, wherein the generating step uses a Legendre polynomial.

52. The method of claim 46, wherein the generating step uses an axially symmetric phase function.

53. The method of claim 46, wherein the generating step uses a *Henyey-Greenstein* phase function.

54. The method of claim 46, wherein the generating step does not use a Monte-Carlo technique.

55. The method of claim 46, wherein the altering step adds a multiple scattering effect to the image.

56. The method of claim 46, wherein the altering step removes a multiple scattering effect from the image.

57. A method of monitoring weather conditions in an area, comprising the steps of:

locating an image acquisition device in a location suitable for capturing images of multiple light sources;

sequentially aiming the direction of the image acquisition device at each of the multiple light sources;

capturing an image of each of the multiple light sources;

identifying the light source in each of the images;

modeling multiple scattering of light from the light source using a Radiative Transfer Equation for Spherical Media; and

determining at least one of the forward scattering parameter, the optical thickness, the visibility of area using the Radiative Transfer Equation for Spherical Media.

58. The method of claim 57, wherein the area is an airport.

59. The method of claim 57, wherein the area is a highway.

60. A method of monitoring weather conditions in an area, comprising the steps of:

locating a first image acquisition device in a first location suitable for capturing images of a first light source;

locating a second image acquisition device in a second location suitable for capturing images of a second light source;

capturing an image of each of the first light source and the second light source;

identifying the light source in each of the images;

modeling multiple scattering of light from each light source using a Radiative Transfer Equation for Spherical Media; and

determining at least one of the forward scattering parameter, the optical thickness, the visibility of the area using the Radiative Transfer Equation for Spherical Media.

61. The method of claim 60, wherein the area is an airport.

62. The method of claim 60, wherein the area is a highway.

63. A method of monitoring weather conditions in an area, comprising the steps of:

locating an image acquisition device in a location suitable for capturing images of a light source;

capturing multiple images of the light source;

averaging the images to produce an averaged image;

identifying the light source in the averaged image;

modeling multiple scattering of light from the light source as captured in the averaged image using a Radiative Transfer Equation for Spherical Media; and

determining at least one of the forward scattering parameter, the optical thickness, the visibility of area using the Radiative Transfer Equation for Spherical Media.

64. The method of claim 63, wherein the area is an airport.

65. The method of claim 63, wherein the area is a highway.